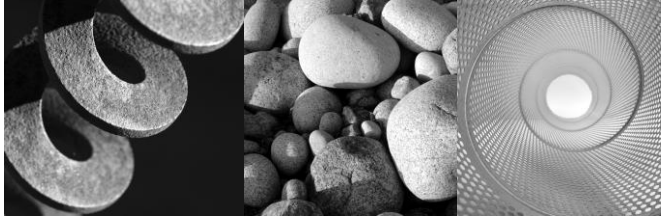

GEI Consultants

Geotechnical
Environmental
Resources
Ecological

Specific Site Assessment for Blue Valley Power Station North and South Fly Ash Ponds and Bottom Ash Pond

Independence, Missouri

Submitted to:
U.S. Environmental Protection Agency
Office of Resource Conservation and Recovery
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Washington, DC 20460

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List of Acronyms

CCW	coal combustion waste
CMP	corrugated metal pipe
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GEI	GEI Consultants, Inc.
IDF	inflow design flood
MW	megawatts
NPDES	National Pollutant Discharge Elimination System
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USGS	U.S. Geological Survey

1.0 Introduction

1.1 Purpose

This report presents the results of a specific site assessment of the dam safety of two fly ash ponds and one bottom ash pond at the Blue Valley Power Station in Independence, Missouri. The Blue Valley Power Station is owned and operated by City of Independence, Missouri.

The two fly ash impoundments are the North Fly Ash Pond and the South Fly Ash Pond. The third impoundment is the Bottom Ash Pond. The Bottom Ash Pond is currently the only active impoundment at the Blue Valley Power Station serving as a collection pond with a recirculation pump/pipeline system for ash slurry. Both the North and South Fly Ash Ponds have been taken out of service effective 2008 and 1991, respectively. However, the North Fly Ash Pond is occasionally flooded to maintain the water surface and to control dusting. The specific site assessments were performed on November 4, 2010.

The specific site assessment was performed with reference to Federal Emergency Management Agency (FEMA) guidelines for dam safety, which includes other federal agency guidelines and regulations (such as U.S. Army Corps of Engineers [USACE] and U.S. Bureau of Reclamation [USBR]) for specific issues. The assessment defaults to state requirements where not specifically addressed by federal guidance or if the state requirements were more stringent.

1.2 Scope of Work

The scope of work between GEI Consultants, Inc. (GEI) and the U.S. Environmental Protection Agency (EPA) for the specific site assessment is summarized in the following tasks:

1. Acquire and review any existing reports and drawings relating to the safety of the project provided by the EPA and Owners.

2. Conduct detailed physical inspections of the project facilities. Document observed conditions on Field Assessment Check Lists provided by EPA for each management unit being assessed.

3. Review and evaluate any existing stability analyses of the project's coal combustion waste impoundment structures.

4. Review the appropriateness of the inflow design flood (IDF), and adequacy of ability to store or safely pass the inflow design flood, provision for any spillways, including considering the hazard potential in light of conditions observed during the inspections or to the downstream channel.

5. Review existing dam safety performance monitoring programs and recommend additional monitoring, if required.

6. Review existing geologic assessments for the projects.

7. Submit draft and final reports.

1.3 Authorization

GEI performed the coal combustion waste impoundment assessment as a contractor to the EPA. This work was authorized by EPA under Delivery Order EP09W001698 between EPA and GEI, dated August 12, 2009.

1.4 Project Personnel

The scope of work for this task order was completed by the following personnel from GEI:

Steven R. Townsley, P.E.	Senior Project Engineer/Task Leader
Stephen G. Brown, P.E.	Project Manager
William Butler, P.E.	Project Geotechnical Engineer
Nick Miller, P.E.	Project Water Resources Engineer

The Program Manager for the EPA was Stephen Hoffman.

1.5 Limitation of Liability

This report summarizes the assessment of dam safety of the North and South Fly Ash Ponds, and the Bottom Ash Pond at Blue Valley Power Station located in Independence, Missouri. The purpose of each assessment is to evaluate the structural integrity of the impoundments and provide summaries and recommendations based on the available information provided and on engineering judgment. GEI used a professional standard of practice to review, analyze, and apply pertinent data. No warrantees express or implied, are provided by GEI. Reuse of this report for any other purpose, in part or in whole, is at the sole risk of the user.

1.6 Project Datum

The project datum was not identified on the documents reviewed by the assessment team.

1.7 Prior Inspections

The embankments for each of the Blue Valley Power Station impoundments are inspected two times per year by plant engineering personnel. However, reports documenting findings during the inspections and/or corrective actions taken as a result of the inspection have not historically been prepared.

The Blue Valley Power Station impoundments were inspected by the Missouri Department of Natural Resources – Division of Geology and Land Survey on May 22, 1988. It is our understanding that no other third-party inspections of the pond embankments have been performed.

2.0 Description of Project Facilities

2.1 General

Blue Valley Power Station is a coal-fired power plant located in the town of Independence, in Jackson County, Missouri (See Figure 1). The power plant consists of three units that have a combined generating capacity of about 93 megawatts (MW). Two 21 MW units went online in 1958 and a third, 51 MW unit went online in 1965. All units are seasonal units that operate primarily during the summer months, but are available year round on an as needed basis. All units are now owned and operated by the City of Independence, Missouri.

The power plant generates about 10,000 to 15,000 tons of ash material annually. Approximately 85% of the ash generated is fly ash and the remaining 15% is bottom ash. All of the fly ash generated at the plant is disposed of off-site. The bottom ash is collected within the Bottom Ash Pond and is dredged from the pond on an as-needed basis. The dredge bottom ash is then disposed of off-site.

The three ash storage ponds are located north of the power plant. The South Fly Ash Pond and the Bottom Ash Pond are located adjacent to each other immediately north of the plant. The South Fly Ash Pond is the easterly pond and the Bottom Ash Pond is the westerly pond. The North Fly Ash Pond is located north of both the South Fly Ash Pond and Bottom Ash Pond (See Figure 1). The Bottom Ash Pond is currently in service. The North and South Fly Ash Ponds were taken out of service in 2008 and 1991, respectively. However, the North Fly Ash Pond is occasionally flooded to maintain the water surface and to control dusting. Currently the North and South ponds are emergency back-up fly ash storage areas.

2.2 Impoundment Dams and Reservoirs

The ash ponds impoundment dikes at the Blue Valley Power Station have not been assigned a hazard potential by a state or federal agency. Based on the geometry of the impoundments and the ancillary facilities, recommended hazard potential classifications for the impoundments are discussed in Section 4.0 of this report.

The three impoundments are used to store fly ash and bottom ash. The North and South Fly Ash Ponds were used to impound fly ash until they were taken out of service in 2008 and 1991, respectively. However, the North Fly Ash Pond is occasionally flooded to maintain the water surface and to control dusting. The Bottom Ash Pond is still in service for collection of bottom ash produced by the plant. The Bottom Ash Pond is periodically dredged and the ash material is disposed of off-site.

Based on the borings performed by Layne Western Company in 1977, the dikes appear to be homogeneous in that they were not constructed with distinct zones of differing soil materials. The subsurface exploration indicates the dikes were constructed of on-site silty sand, silty clay, clayey silts and sandy silts. The dikes were designed without internal drains from the collection of seepage.

The perimeter dike for the North Fly Ash Pond has an approximate crest width of 10 feet and design upstream and downstream side slopes of 3H:1V and 4H:1V, respectively. The perimeter dike for the South Fly Ash Pond has a minimum design crest width of 15 feet and design upstream and downstream side slopes of 2H:1V. The perimeter dike for the Bottom Ash Pond has a minimum design crest width of 15 feet and design upstream and downstream side slopes of 2H:1V. From stations 13+80 to 20+05 and 22+60 to 23+30 the crest width is 7.5 feet.

The basic dimensions and geometry of the three impoundments are summarized in Table 2-1.

Table 2-1: Summary Information for Impoundment Dike Parameters

Parameter	Value		
Dam	North Fly Ash Pond	South Fly Ash Pond	Bottom Ash Pond
Maximum Height (ft)	22	19	13
Approximate Length (ft)	3,675	3,450	3,600
Approximate Crest Width (ft)*	10	15	15*
Lowest Crest Elevation (ft)	770	767	767
Design Side Slopes (H:V)	3:1 US/4:1 DS	2:1 US/2:1 DS	2:1 US/2:1 DS
Estimated Freeboard (ft) at time of site visit	4.5	3	3
Total Storage Capacity (cubic yards)**	214,653	406,638	436,637
Approximate Surface Area (acres)**	16.77	15.12	9.26

* From stations 13+80 to 20+05 and 22+60 to 23+30 the crest width is 7.5 feet.
** Storage capacity and area values provided by City of Independence Power & Light.

2.3 Spillways

None of the impoundments have spillways.

2.4 Intakes and Outlet Works

2.4.1 North Fly Ash Pond

The intake structure at the North Fly Ash Pond consists of a 7-inch steel pipe from the power plant. The overflow outlet structure (see Photo 7) consists of an 8-inch diameter PVC pipe which discharges into the Bottom Ash Pond. Currently, there is no active flow through the outlet structure.

2.4.2 South Fly Ash Pond

Decant stormwater is routed from the South Fly Ash Pond to the Bottom Ash Pond through a 4" PVC pipe located through the interior separating dike. The overflow pipe is located on the east dike that separates the Bottom Ash Pond from the South Fly Ash Pond. Currently, there is no active flow through the outlet structure.

2.4.3 Bottom Ash Pond

The bottom ash and other products (such as clarifier blowdown, cooling tower blowdown, demineralizer waste, and plant drains) produced by the Blue Valley Power Plant is routed to the Bottom Ash Pond through pipes and discharges into the pond at the southwest corner (see Photos 6, 14 and 16). The outlet structure consists of a 12-inch diameter welded steel pipe. At the time of the inspection the outlet was observed to have active flow through the structure.

The water surface in Bottom Fly Ash Pond is regulated by a control structure located in the southeastern portion of the pond that discharges to a sanitary sewer (see Photo 12).

2.5 Vicinity Map

Blue Valley Power Station is located in the town of Independence in Jackson County, Missouri, as shown on Figure 1. The impoundments are located to the north of the station. The latitude and longitude of the pond complex is provided below:

Longitude: 94 Degrees, 19 Minutes, 23 Seconds
Latitude: 39 Degrees, 5 Minutes, 52 Seconds

2.6 Plan and Sectional Drawings

We were not provided with the original design documents for this project. We were provided with:

- Engineering drawings for the South Fly Ash Pond and Bottom Ash improvement project in 1977-78 were prepared by Burns and McDonnell dated December 30, 1977.
- The engineering drawings for the North Fly Ash Pond project in 1988 were prepared by Stanley Consultants dated July 1, 1988.

2.7 Standard Operational Procedures

Blue Valley Power Station is a coal-fired power plant composed of three coal-fired steam turbine electric power generating units that can produce a total combined capacity of 93 MW. The coal supply is from Kansas and is delivered to the power plant by truck, where it is then combusted to power the steam turbines. The burning of coal produces several gases which

are vented from the boiler; fly ash, which is collected from the exhaust prior to venting to the atmosphere; and coarser bottom ash, which falls to the bottom of the boiler and is removed along with boiler slag.

Bottom ash is wet sluiced into the Bottom Ash Pond where it is temporarily stored. When necessary, the bottom ash is dredged from the Bottom Ash Pond and disposed of off-site. Excess water is decanted from the Bottom Ash Pond and discharged into the sanitary sewer for disposal. The discharge water from the pond is monitored to meet the National Pollutant Discharge Elimination System (NPDES) permit requirements for discharge without chemical treatment.

The North and South Fly Ash Ponds have not been active since 2008 and 1991, respectively. In 2008 the wet process was changed to a dry process and the fly ash is now hauled and disposed of off-site. The North and South Fly Ash ponds are held in reserve for temporary emergency fly ash storage. The North Fly Ash Pond is occasionally flooded to maintain the water surface and to control dusting.

3.0 Summary of Construction History and Operation

There are three power generating units at the Blue Valley Power Station. The initial two (2) units went online in 1958 and the third unit went online in 1965. Although we were not provided with any documentation, we understand that the current South Fly Ash Pond and Bottom Ash pond were constructed and went into service at the plant inception. Both of these ponds underwent improvements in 1977-78. The design for these improvements was performed by Burns and McDonnell.

In 1988 the North Fly Ash Pond was designed by Stanley Consultants. Construction of the pond is assumed to have been performed shortly after the design was completed. The North and South Fly Ash Ponds were taken out of service in 2008 and 1991, respectively. However, the North Fly Ash Pond is occasionally flooded to maintain the water surface and to control dusting. Today both fly ash ponds are used as emergency fly ash storage areas.

We have reviewed the design drawings provided for each of the ash ponds and dikes, however, design reports and construction records were not located for review. Based on our review of subsurface information obtained by Layne-Western Company for Burns and McDonnell in 1977 and our site observations, it appears that the dikes for the South Fly Ash Pond and the Bottom Ash Pond were constructed of earthfill materials obtained from on site, which consists of a combination of silty sands, sandy silts, clayey silts, and silty clays. No documentation about foundation preparation is present on the design drawings and as-constructed reports were not available for review.

Noted on the 1988 design drawings for the North Fly Ash Pond were borings performed in the vicinity of the proposed pond. However, the subsurface investigation report and/or boring logs could not be located. Based on our site observations, it appears that the dike for the North Fly Ash Pond was constructed of similar types of earthfill materials used to construct the other two pond dikes. There was no documentation available about foundation preparation and dike construction.

Based on visual observations during the site visit and review of available construction records, the embankments were not constructed over wet ash, slag or other unsuitable materials. Evidence of prior releases, failures or patchwork construction were not observed or evident based on review of available design documents or disclosed by plant personnel during the site visit.

4.0 Hazard Potential Classification

4.1 Overview

According to the Federal Guidelines for Dam Safety, the hazard potential classification for the impoundments is based on the possible adverse incremental consequences that result from release of stored contents due to failure or improper operation of the dam or appurtenances. Impoundments are classified as: Less than Low, Low, Significant, or High hazard, depending on the potential for loss of human life and/or economic and environmental damages.

4.2 North Fly Ash Pond Discussion

The North Fly Ash Pond has a total surface area of 16.77 acres and a storage capacity of 214,653 cubic yards assuming an average depth of 15 feet. The maximum height of the pond dike embankment is 22 feet. Based on current embankment heights and storage capacity shown in Table 2-1, the size classification for the North Fly Ash Pond is "Small" in accordance with the USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 criteria.

The North Fly Ash Pond is not currently in service. Excess storm water enters the impoundment outlets through an 8-inch PVC outlet pipe into the Bottom Ash Pond.

4.3 South Fly Ash Pond Discussion

The South Fly Ash Pond has a total surface area of 15.12 acres and a storage capacity of 436,637 cubic yards assuming an average depth of 15 feet. The maximum height of the pond is 19 feet. Based on current pond heights and storage capacity shown in Table 2-1, the size classification for South Fly Ash Pond is "Small" in accordance with the USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 criteria.

The South Fly Ash Pond is not currently in service. Excess stormwater enters the impoundment outlets through a 4-inch PVC pipe to the Bottom Ash Pond.

4.4 Bottom Ash Pond Discussion

The Bottom Ash Pond has a total surface area of 9.26 acres and a storage capacity of 214,653 cubic yards assuming an average depth of 17 feet. The maximum height of the embankment is 13 feet. Based on current embankment heights and storage capacity shown in Table 2-1, the size classification for the Bottom Ash Pond is "Small" in accordance with the USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 criteria.

The Bottom Ash Pond is currently in service. The discharge from the power plant, which includes bottom ash and others (clarifier blowdown, cooling tower blowdown, demineralizer waste and plant drains) discharges into the Bottom Excess Ash Pond. Stormwater drains into the Bottom Ash Pond from both the North and South Fly Ash Ponds. The Bottom Ash Pond is dredged occasionally and the dredged materials are disposed of off-site. The return water inlet located at the north end of the Bottom Ash Pond is currently in service and pumps recirculating water back to the plant. The water surface of the Bottom Ash Pond is also regulated by the outlet to the sanitary sewer system at the southeast corner of the pond.

4.5 Hazard Classifications

The three ponds at this facility are located approximately 2 miles upstream of the Little Blue River. Between the ponds and the river are Truman Road, County Highway 78 and numerous farm fields. Located just east and downstream of the ponds is an abandoned railroad embankment for the former Missouri Pacific Railroad spur which connected to the plant site. There is a 48-inch diameter storm water corrugated metal pipe (CMP) culvert which traverses the railroad spur. We believe that the railroad embankment will act as a secondary containment for the ponds should they experience a failure and that this embankment will control the amount of discharge off-site through the 48" CMP culvert (see Photo 4). Therefore, we would not expect there to be flooding occurring downstream which would result in loss of life, and we would also expect a limited amount of fly ash to leave the site.

Based on this information, our observations, and to comply with the Federal Guidelines for Dam Safety, we recommend the dikes for the North and South Fly Ash Ponds and the Bottom Ash Pond be classified as “Low” hazard structures.

5.0 Hydrology and Hydraulics

5.1 Floods of Record

Floods of record have not been evaluated and documented for the impoundments at the Blue Valley Power Station. Based on Intellicast Data Records, the average monthly rainfall for Independence, Missouri ranges from 1.43 inches in January to 5.15 inches in June. According to the National Climatic Data Center, which holds data for daily rainfall recorded for the period between 1990 and 2010, the maximum 24-hour rainfall event in Independence, Missouri occurred on May 7, 2005 with a rainfall amount of 6.38 inches. In the neighboring area of Kansas City, Missouri, daily rainfall data has been recorded since 1938 with the exception of the years between 1972 and 1978. This data indicates that the maximum 24-hour rainfall event was recorded on August 15, 1969 with a rainfall amount of 7.45 inches.

These rainfall events are not expected to result in overtopping of the dams under the current normal operating conditions. No documentation has been provided to verify the storm results.

5.2 Inflow Design Floods

Currently there is no hazard classification for the coal combustion waste (CCW) impoundments at the Blue Valley Power Station. Based on observations during the field inspection, we recommend the Bottom Ash Pond, South Fly Ash Pond, and North Fly Ash Pond be rated "Low" hazard dams (see Section 4.0). Based on the recommended "Low" hazard classification, the Missouri Dam Safety Laws and Regulations specifies conventional environmental Class III dams be capable of passing the 100-year flood event without overtopping the dam. The USACE Recommended Guidelines for Safety Inspection of Dams ER 1110-2-106 recommends a small "Low" hazard dam be capable of passing the 50-year to 100-year storm event without overtopping the dam. Considering the "Low" hazard rating, the scale of the economic and environmental damages that could potentially occur upon failure, and the recommended range of inflow design storms, it is reasonable to select the 100-year design storm for the Bottom Ash Pond, South Fly Ash Pond, and North Fly Ash Pond. Accordingly, the 100-year 24-hour storm precipitation at the Blue Valley Power Station is about 7.7 inches based on Technical Paper No. 40, Rainfall Frequency Atlas of the United States for Durations from 30 minutes to 24 hours and Return Periods from 1 to 100 Years.

5.2.1 North Fly Ash Pond

The contributing drainage area to the North Fly Ash Pond includes the impoundment's surface area (Table 2-1). The water surface in North Fly Ash Pond is regulated by a decant pipe structure located in the southwestern portion of the pond that discharges to Bottom Ash Pond. Currently, the North Fly Ash Pond water level is maintained at elevation 765.5 feet,

providing about 4.5 feet of freeboard. Under the current configuration, the decant structure invert elevation is at about 767.5, providing 2 feet of available storage before water is discharged to the Bottom Ash Pond. Based on the 24-hour 100-year precipitation event of 7.7 inches, the North Fly Ash Pond water surface would increase by less than 1 foot during the design storm, which would result in about 3.8 feet of residual freeboard. Based on these results, the North Fly Ash Pond meets the regulatory requirements for storage of the 24-hour 100-year inflow design flood without overtopping the dam.

5.2.2 South Fly Ash Pond

The contributing drainage area to the South Fly Ash Pond includes the impoundment's surface area (Table 2-1). The water surface in South Fly Ash Pond is regulated by a decant pipe structure located in the western portion of the pond that discharges to the Bottom Ash Pond. Currently, the South Fly Ash Pond water level is maintained at elevation 764 feet, providing about 3.0 feet of freeboard. Under the current configuration, the decant structure invert elevation is at about 765.7, providing 1.7 feet of available storage before water is discharged to the Bottom Ash Pond. Based on the 24-hour 100-year precipitation event of 7.7 inches, the South Fly Ash Pond water surface would increase by less than 1 foot during the design storm, which would result in about 2.3 feet of residual freeboard. Based on these results, the South Fly Ash Pond meets the regulatory requirements for storage of the 24-hour 100-year inflow design flood without overtopping the dam.

5.2.3 Bottom Ash Pond

The contributing drainage area to Bottom Ash Pond includes the impoundment's surface area (Table 2-1). Additionally, decant water in South Fly Ash Pond is routed to Bottom Ash Pond through a decant structure located through the interior separating dike producing a total contributing drainage area of about 24.4 acres. The water surface in Bottom Ash Pond is regulated by a concrete decant structure located in the southeastern portion of the pond that discharges to a sanitary sewer. Currently, the Bottom Ash Pond water level is maintained at elevation 764.0 feet, providing about 3.0 feet of freeboard. Based on the 24-hour 100-year precipitation event of 7.7 inches, Bottom Ash Pond will not receive inflow from the South Fly Ash Pond and the Bottom Ash Pond water surface would increase by less than 1 foot during the design storm, which would result in about 2.3 feet of residual freeboard. Based on these results, the Bottom Ash Pond meets the regulatory requirements for storage of the 24-hour 100-year inflow design flood without overtopping the dam.

5.2.4 Determination of the PMF

Not applicable.

5.2.5 Freeboard Adequacy

Based on the data obtained, the freeboard is adequate at each of the three CCW impoundments at the Blue Valley Power Station.

5.2.6 Dam Break Analysis

It is our understanding that there have been no dam break analyses performed for the CCW impoundments at the Blue Valley Power Station.

5.3 Spillway Rating Curves

Not applicable.

5.4 Evaluation

Based on the current facility operations and inflow design floods documents, the CCW impoundments at the Blue Valley Power Station appear to have adequate capacity to store the regulatory design floods without overtopping the dams based on the recommended hazard classifications for the dams.

6.0 Geologic and Seismic Considerations

The Layne Western Company boring logs from the exploration in 1977 for the Blue Valley Power Station indicate that the overburden soils generally consist of soft to very stiff silty clays and clayey silts, in addition to loose to medium dense silty sands and sandy silts. The borings extend to a maximum of about 15 to 64.5 feet below the existing ground surface at the time of the exploration. Bedrock was not encountered within the borings performed. Geologic information about the underlying bedrock in the area was not available.

We are not aware of any seismic analyses that have been performed on the ash ponds at the Blue Valley Power Station. According to the 2008 U.S. Geological Survey (USGS) Seismic Hazard Map of Missouri (see Figure 2), the site has a regional probabilistic peak ground acceleration of [0.05g] with a 2 percent Probability of Exceedance within 50 years (recurrence interval of approximately 2,500 years).

7.0 Instrumentation

7.1 Location and Type

Instrumentation associated with the impoundments at Blue Valley Power Station is very limited and consists of a flow meter at the outlet discharge into the sanitary sewer at the southeast corner of the Bottom Ash Pond. We are not aware of any other instrumentation associated with the three impoundments.

7.2 Readings

7.2.1 Flow Rates

Flow rates are monitored with a flowmeter at the discharge pipe into the sanitary sewer within the Bottom Ash Pond (see Photo 13). Blue Valley Power Station personnel obtain flow rate readings on a continuous basis, logging the maximum and average daily flows for each month.

7.2.2 Staff Gauges

There are no staff gauges in use at any of the three impoundments at the Blue Valley Power Station.

7.3 Evaluation

There are currently no piezometers in place to monitor water levels within the dikes for the three ponds. Information on water levels within the embankment would be useful to estimate piezometric conditions for future seepage and slope stability analyses, and to monitor these conditions over time. Piezometers installed in the east dike of the North Fly Ash Pond would be useful in determining the amount and source of seepage in that location. Although seepage was observed at the toe of the dike, we did not observe any signs of instability at this location or along any of the dikes inspected.

8.0 Field Assessment

8.1 General

A site visit to assess the condition of the three impoundments at the Blue Valley Power Station was performed on November 4, 2010, by Steven R. Townsley, P.E. and William Butler, P.E., of GEI; and Eric Holder and Gerry McReynolds with City of Independence Power & Light Department assisted in the assessment.

The weather during the site visit (November 4, 2010) was generally sunny with temperatures around 35 degrees Fahrenheit and very windy. The majority of the ground was dry at the time of the site visit. The last "significant" rainfall event at this site occurred on October 23, 2010 when 0.33 inches of rain recorded.

At the time of inspection, GEI completed an EPA inspection checklist which is provided in Appendix A. Photographs are provided in Appendix B. Field assessment of the impoundments included a site walk to observe the dam crest, upstream slope, downstream slope, intake structures and outlet structures. Each of the three impoundments is discussed separately below.

8.2 North Fly Ash Pond

The North Fly Ash Pond was taken out of service in 2008; and still currently functions as an emergency back-up storage pond. Water is occasionally discharged into the North Fly Ash Pond to control dusting from the pond surface.

8.2.1 Impoundment Dike

8.2.1.1 Dike Crest

The crest of the dike at the North Fly Ash Pond appeared to be in good condition (see Photo 1). No signs of cracking, settlement, movement, erosion or deterioration were observed during the assessment. The crest appears to be well-drained and no standing water was observed. The dike crest surface is generally composed of gravel road base material that traverses the length of the dike for vehicle access.

8.2.1.2 Upstream Slope

The upstream slopes of the dike at the North Fly Ash Pond are generally covered with small riprap. The upstream slope protection appeared to be in good condition. No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.2.1.3 Downstream Slope

The downstream slopes of the dike at the North Fly Ash Pond have well-established grass growth, which provides some erosion protection. No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.2.2 Seepage and Stability

There are wet areas within a storm water drainage ditch that runs along the toe of the east dike. The wet areas may be due to standing water within the drainage ditch, however it also could be seepage exiting from the toe of the dike (see Photos 2 and 3). Further evaluation should be conducted to determine the source of water in the wet areas.

There are no signs of slope instability along the dike.

8.2.3 Appurtenant Structures

8.2.3.1 Outlet Structure

The outlet structure consists of an 8-inch diameter PVC pipe and appears to be in good condition. The invert for the overflow pipe is at elevation 768.0 feet. Currently, there is no active flow through the outlet structure.

8.2.3.2 Pump Structures

No pumps are present at the North Fly Ash Pond.

8.2.3.3 Emergency Spillway

No spillways are present at the North Fly Ash Pond.

8.2.3.4 Drains

No internal or toe drains are present in the dike at the North Fly Ash Pond.

8.2.3.5 Water Surface Elevations and Reservoir Discharge

At the time of our inspection on November 4, 2010 the North Fly Ash Pond water level was observed to be at an approximate elevation of 765.5 feet. The water surface of the North Pond is controlled by the overflow pipe to the Bottom Ash Pond which has an invert elevation of 768.0 feet.

8.3 South Fly Ash Pond

The South Fly Ash Pond was taken out of service in 1991. Currently the pond functions as an emergency back-up storage pond. Excess water from the South Fly Ash Pond discharges to the Bottom Ash Pond.

8.3.1 Impoundment Dike

8.3.1.1 Dike Crest

The crest of the dike at the South Fly Ash Pond appeared to be in good condition. No signs of cracking, settlement, movement, erosion or deterioration were observed during the assessment. The crest appears to be well-drained and no standing water was observed. The dike crest surface is generally composed of gravel road base material that traverses the length of the dike for vehicle access.

8.3.1.2 Upstream Slope

The upstream slopes of the dike at the South Fly Ash Pond are generally covered with small riprap. The upstream slope protection appeared to be in good condition. No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.3.1.3 Downstream Slope

The downstream slopes of the dike at the South Fly Ash Pond have well-established grass growth, which provides some erosion protection (see Photo 11). No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.3.2 Seepage and Stability

We observed no signs of seepage or slope instability in the dike during our inspection of the South Fly Ash Pond.

8.3.3 Appurtenant Structures

8.3.3.1 Outlet Structure

The outlet consists of a 4-inch diameter PVC pipe that outlets to the Bottom Ash Pond.

8.3.3.2 Pump Structures

No pumps are present at the South Fly Ash Pond.

8.3.3.3 Emergency Spillway

No spillways are present at the South Fly Ash Pond.

8.3.3.4 Drains

No internal or toe drains are present in the dike at the South Fly Ash Pond.

8.3.3.5 Water Surface Elevations and Reservoir Discharge

At the time of our inspection on November 4, 2010, the South Fly Ash Pond water level was observed to be at an approximate elevation of 764 feet.

8.4 Bottom Ash Pond

8.4.1 Impoundment Dike

8.4.1.1 Dike Crest

The crest of the dike at the Bottom Ash Pond appeared to be in good condition (see Photos 10 and 15). No signs of cracking, settlement, movement, erosion or deterioration were observed during the assessment. The crest appears to be well-drained and no standing water was observed. The dike crest surface is generally composed of gravel road base material that traverses the length of the dike for vehicle access.

8.4.1.2 Upstream Slope

The upstream slopes of the dike at the Bottom Ash Pond are generally covered with small riprap. The upstream slope protection appeared to be in good condition. No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment.

8.4.1.3 Downstream Slope

The downstream slopes of the dike at the Bottom Fly Ash Pond have well-established grass growth, which provides some erosion protection. No scarps, sloughs, depressions or other indications of slope instability or signs of erosion were observed during the inspection of the impoundment. A few small trees were noted to be growing on the slope of the pump house access road (see Photo 9). At this time, these trees do not present a concern, however consideration should be given to their removal.

8.4.2 Seepage and Stability

We observed no signs of seepage or slope instability in the dike during our inspection of the Bottom Ash Pond.

8.4.3 Appurtenant Structures

8.4.3.1 Outlet Structure

The outlet structure appears to be in good working condition and consists of a 12-inch diameter steel welded pipe discharging into a 12-foot long by 4-foot wide concrete vault that empties into the sanitary sewer system. There was a small amount of debris at the trash rack, but did not restrict flow into the outlet. The channel from the pond to the outlet was riprap and free flowing.

8.4.3.2 Pump Structures

There is a return water pump house and intake structure located at the north end of the Bottom Ash Pond (see Photos 5 and 6).

8.4.3.3 Emergency Spillway

No spillways are present at the Bottom Ash Pond.

8.4.3.4 Drains

No internal or toe drains are present in the dike at the Bottom Ash Pond.

8.4.3.5 Water Surface Elevations and Reservoir Discharge

At the time of our inspection on November 4, 2010 the Bottom Ash Pond water level was observed to be at an approximate elevation of 764 feet.

The water surface in Bottom Ash Pond is regulated by an outlet pipe with an invert elevation of approximately 763.6 feet located at the southeast corner of the Bottom Ash Pond.

9.0 Structural Stability

9.1 Visual Observations

The assessment team saw no visible signs of instability associated with the dikes of the three impoundments during the November 4, 2010 site assessment. However, there are wet areas within a storm water drainage ditch that runs along the toe of the east dike to the North Fly Ash Pond. The wet areas may be due to standing water within the drainage ditch, however they also could be seepage from the toe of the dike. Further evaluation should be conducted to determine the source of water in the wet areas.

9.2 Field Investigations

Records of borings completed when the three impoundments were designed and constructed were not available. We did review boring logs from an exploration performed for the South Fly Ash Pond and Bottom Ash Pond in 1977, when the dike improvement project was performed. Ten borings were drilled through the crest during this exploration extending to depths ranging from 15 to 64.5 feet below the existing ground surface at that time. Numerous other borings were performed inside and outside of the footprints of the ponds and within the area of the power plant facility. The boring logs and/or exploration report for the borings shown on the design drawings for the North Fly Ash Pond could not be located.

9.3 Seepage and Stability Analysis

To our knowledge, seepage or stability analyses have not been performed for any of the three impoundments. If these analyses have been performed in the past, the documents could not be located for review during the inspection or reporting period.

9.4 Seismic Stability – Liquefaction Potential

The documentation of liquefaction potential of the embankment and foundation materials could not be located and may not exist.

10.0 Maintenance and Methods of Operation

10.1 Procedures

Blue Valley Power Plant produces power primarily during the summer months, but is available year round, and thus, is manned 24 hours a day, seven days a week. Bi-annual inspections are performed for the ash pond facilities by operations staff to observe the general condition of structures and dikes. It is our understanding that the inspection procedure is not documented and the personnel involved in the inspections are not formally trained to perform the inspections.

10.2 Maintenance of Impoundments

Maintenance of the three impoundments is performed by Blue Valley Power Station staff under the guidance of Blue Valley Power Station managers and engineers.

10.3 Surveillance

The ash ponds are not regularly patrolled by Blue Valley Power Station operations personnel. Plant personnel are available at the power plant and on 24-hour call for emergencies that may arise. The plant does not have an emergency alarm system, but they do have a public announcement system which can be used to notify personnel on site in the event of an emergency and convey instructions quickly and effectively.

11.0 Conclusions

11.1 Assessment of Dams

11.1.1 Field Assessment

The dams and outlet works facilities associated with the impoundments at the Blue Valley Power Station were generally found to be in satisfactory condition. No visual signs of instability, erosion, or movement were observed. However, there are wet areas within a storm water drainage ditch that runs along the toe of the east dike of the North Fly Ash Pond. The wet areas may be due to standing water within the drainage ditch, however they could also be seepage from the toe of the dike. Further evaluation should be conducted to determine the source of water in the wet areas.

Slope protection and appurtenant structures appeared to be in good condition.

11.1.2 Adequacy of Structural Stability

Seepage and slope stability analyses and assessment of liquefaction potential of the embankment and foundation materials could not be located and may not exist. We recommend that the seepage and stability analyses be performed to properly assess the stability of the dike embankments. Liquefaction potential at this site appears to be very low and is not considered a concern.

Because it does not appear that borings have been performed at the South Fly Ash Pond and the Bottom Ash Pond after the improvements were made in 1977 and because there are no records of borings for the North Fly Ash Pond either prior to or post construction, we recommend that additional borings be performed prior to performing the analyses under the direction of the engineer performing the seepage and stability analysis.

11.1.3 Adequacy of Hydrologic/Hydraulic Safety

Based on the current facility operations, recommended hazard classifications, and inflow design flood documents, each of the impoundments appear to have adequate capacity to store the regulatory design floods without overtopping the dikes.

11.1.4 Adequacy of Instrumentation and Monitoring

There is very little instrumentation in use associated with the impoundments. As part of the seepage and stability analysis of the embankments, it may be recommended that either temporary or permanent instrumentation be installed. This instrumentation could include installation of piezometers, settlement plates and/or inclinometers at various locations along the dikes depending on the recommendations of the engineer performing the analyses.

A flow meter is in place and measures the flow rates at the discharge pipe into the sanitary sewer within the Bottom Fly Ash Pond. The monitoring program should be continued and documented on a continuous basis.

11.1.5 Adequacy of Maintenance and Surveillance

The impoundments at the Blue Valley Power Station have fair maintenance and surveillance programs.

11.1.6 Adequacy of Project Operations

Operating personnel are knowledgeable and are well trained in the operation of the project. The current operations of the facilities are satisfactory. We do recommend that an ash pond operation manual be prepared and maintained.

12.0 Recommendations

12.1 Corrective Measures and Analyses for the Structures

Seepage and stability analyses of all embankments should be performed to properly assess and document the stability of these structures.

12.2 Corrective Measures Required for Instrumentation and Monitoring Procedures

No corrective measures are required. We do recommend that instrumentation determined by the engineer performing the seepage and stability analyses be installed and maintained.

12.3 Corrective Measures Required for Maintenance and Surveillance Procedures

No corrective measures are required.

12.4 Corrective Measures Required for the Methods of Operation of the Project Works

No corrective measures are required.

12.5 Summary

The following factors were the main considerations in determining the final rating of the impoundments at Blue Valley Power Station.

- The dikes at each of the impoundments are low-hazard structures based on federal and state classifications.
- The impoundments were generally observed to be in good condition in the field assessment.
- Hydrologic analyses indicate the dikes at each pond can store the regulatory design flood without overtopping.
- Seepage and stability analyses of the dikes could not be located and should be performed.
- Maintenance, surveillance and operational procedures are considered adequate.
- An operation plan should be developed and maintained.

12.6 Acknowledgement of Assessment

I acknowledge that the management unit(s) referenced herein was personally inspected by me and was found to be in the following condition **(select one only):**

Management Unit	Rating
North Fly Ash Pond	Fair
South Fly Ash Pond	Fair
Bottom Ash Pond	Fair

SATISFACTORY

No existing or potential management unit safety deficiencies are recognized. Acceptable performance is expected under all applicable loading conditions (static, hydrologic, seismic) in accordance with the applicable criteria. Minor maintenance items may be required.

FAIR

Acceptable performance is expected under all required loading conditions (static, hydrologic, seismic) in accordance with the applicable safety regulatory criteria. Minor deficiencies may exist that require remedial action and/or secondary studies or investigations.

POOR

A management unit safety deficiency is recognized for any required loading condition (static, hydrologic, seismic) in accordance with the applicable dam safety regulatory criteria. Remedial action is necessary. POOR also applies when further critical studies or investigations are needed to identify any potential dam safety deficiencies.

UNSATISFACTORY

Considered unsafe. A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution. Reservoir restrictions may be necessary.

I acknowledge that the management units referenced herein:

Have been assessed on November 4, 2010

Signature: _____

COLORADO REGISTERED
STEVEN R. TOWNSLEY
27730
6-6-2011
PROFESSIONAL ENGINEER

List of Participants:

Steven R. Townsley, P.E.	Senior Project Engineer/Task Leader, GEI Consultants, Inc.
Stephen G. Brown, P.E.	Project Manager
William Butler, P.E.	Project Geotechnical Engineer
Nick Miller, P.E.	Project Water Resources Engineer

13.0 References

Burns and McDonnell "Subsurface Information Report, Blue Valley Generating Station," 1977.

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Burns and McDonnell. (1977). "Project Design Documents Y-1 through Y-13, U-3 and U-4.

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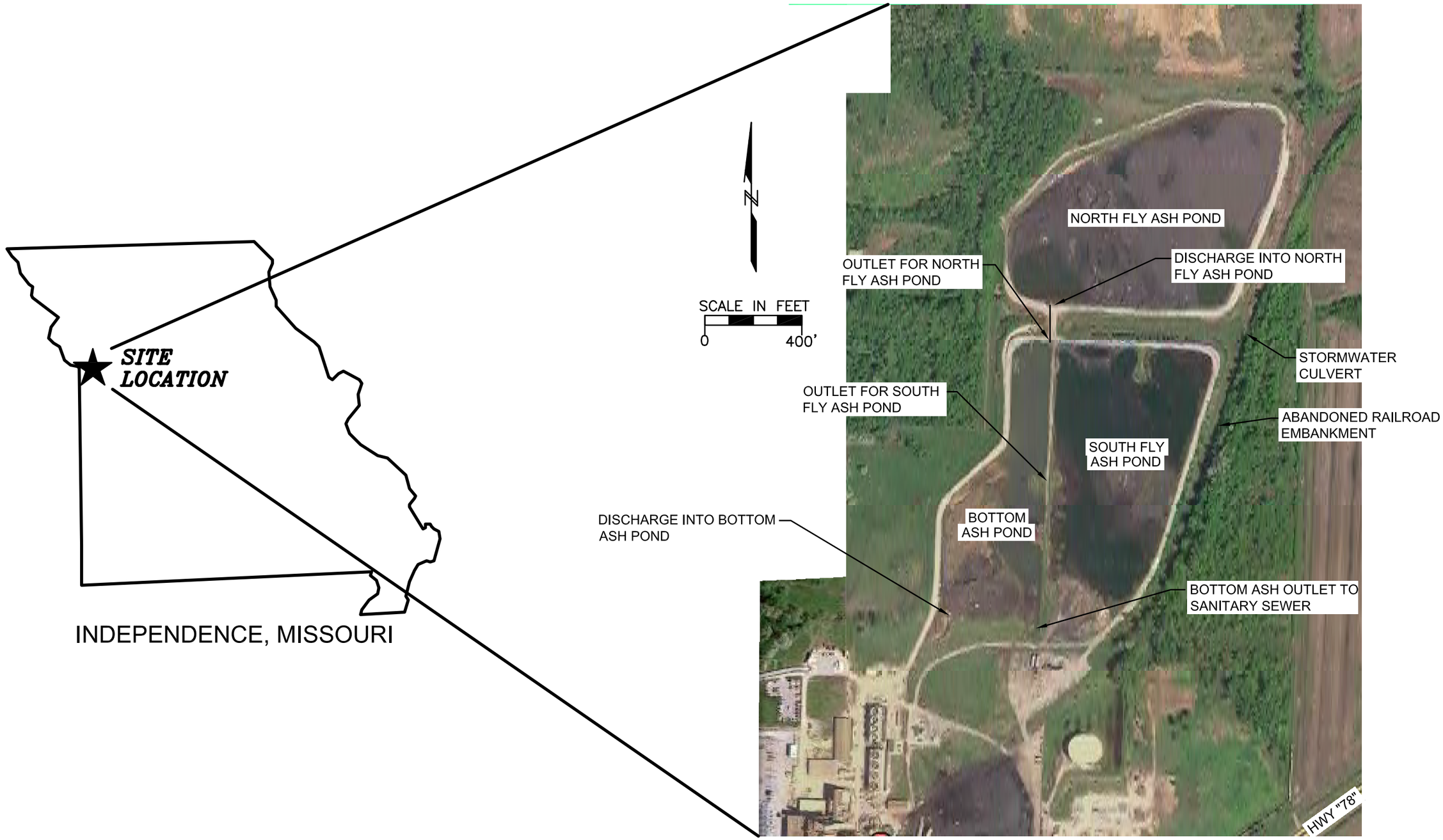
U.S. Army Corps of Engineers (USACE) (1979). "Recommended Guidelines for Safety Inspections of Dams. (ER 1110-2-106)." September.

United States Geologic Survey (USGS) (2008). Seismic Hazard Map for Missouri: Peak Ground Acceleration with 2% Probability of Exceedance within 50 years.

Figures



SPECIFIC SITE ASSESSMENT FOR
BLUE VALLEY POWER STATION, NORTH AND
SOUTH FLY ASH PONDS AND BOTTOM ASH POND
INDEPENDENCE, MISSOURI

ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C.

GEI Consultants

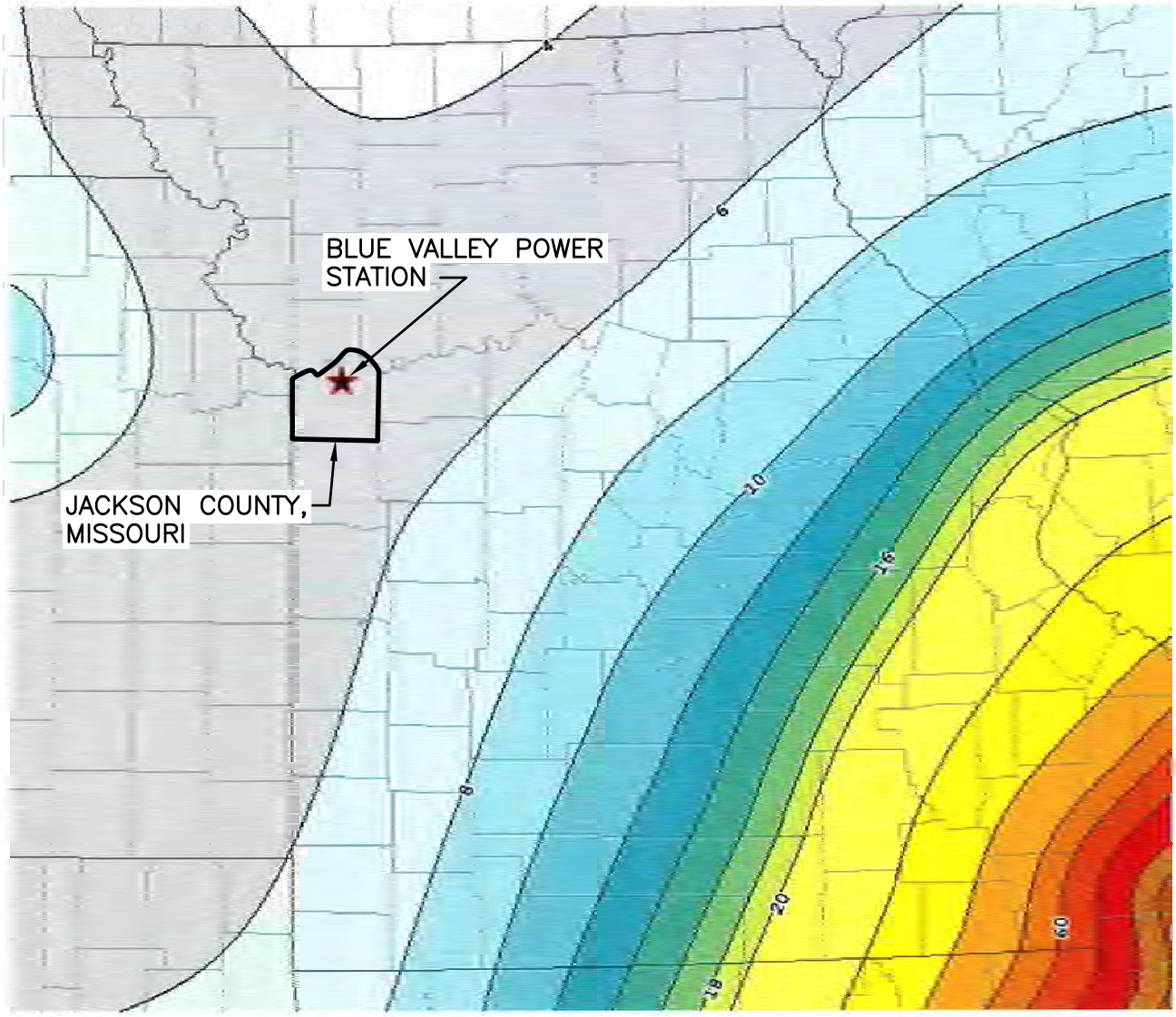
Project 092884

SITE LOCATION DIAGRAM

June 2011

Fig. 1

J:\2010\092884 - Blue Valley Power Station\figure 1



Specific Site Assessment for Blue Valley Power Station, North and South Fly Ash Ponds and Bottom Ash Pond Independence, Missouri	GEI Consultants	2008 U.S. GEOLOGIC SURVEY (USGS) SEISMIC HAZARD MAP OF MISSOURI
Environmental Protection Agency Washington, D.C.	Project 10123-0	June 2011 Fig. 2

J:\2010\092884 - Blue Valley Power Station\figure 2

Appendix A

Inspection Checklists

November 4, 2010

Site Name: **Blue Valley Power Station** Date: **November 4, 2010**

Unit Name: **North Fly Ash Pond** Operator's Name: **City of Independence, MO**

Unit ID: Hazard Potential Classification: High Significant **Low**

Inspector's Name: **Steve Townsley and William Butler – GEI Consultants, Inc.**

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	X		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	~765.5		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	768.0		20. Decant Pipes		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	770		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?		X	Is water exiting outlet flowing clear?	N/A	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?	N/A	
9. Trees growing on embankment? (If so, indicate largest diameter below.)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?	X	
13. Depressions or sink holes in tailings surface or whirlpool in the pool area		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
1. Frequency of Company's Dam Inspections?	There is twice a year maintenance inspections by plant personnel, but no reports are prepared of the findings or corrections taken.
20. Decant Pipes	The pond has been taken of service in 2008 and currently used as an emergency storage area for fly ash.
21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below): From downstream foundation area?	There are wet areas within a storm water drainage ditch that runs along the toe of the east dike. The wet areas are probably due to standing water within the drainage ditch, however also could be seepage from the toe of the dike.

	Further evaluation should be conducted determine the source of water in the wet areas.

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # TBD INSPECTOR: S. Townsley/W. Butler

Date November 4, 2010

Impoundment Name Blue Valley Power Station – North Fly Ash Pond

Impoundment Company City of Independence Power & Light Department

EPA Region 7

State Agency (Field Office) Address N/A

Name of Impoundment: Blue Valley Power Station – North Fly Ash Pond

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update _____

	Yes	No
Is impoundment currently under construction?		X
Is water or ccw currently being pumped into the impoundment?		X

IMPOUNDMENT FUNCTION: Former Fly Ash Collection Pond taken out of service in 2008.

Nearest Downstream Town: Name: Independence, Missouri
Distance from the impoundment: Within the city limits
Impoundment Location:
Longitude 94 Degrees 19 Minutes 23 Seconds
Latitude 39 Degrees 5 Minutes 52 Seconds
State: MO County Jackson

Does a state agency regulate this impoundment? YES X NO _____

If So Which State Agency? Missouri Department of Natural Resources – Division of Geology and Land Survey

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW** HAZARD POTENTIAL: Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

__X__ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

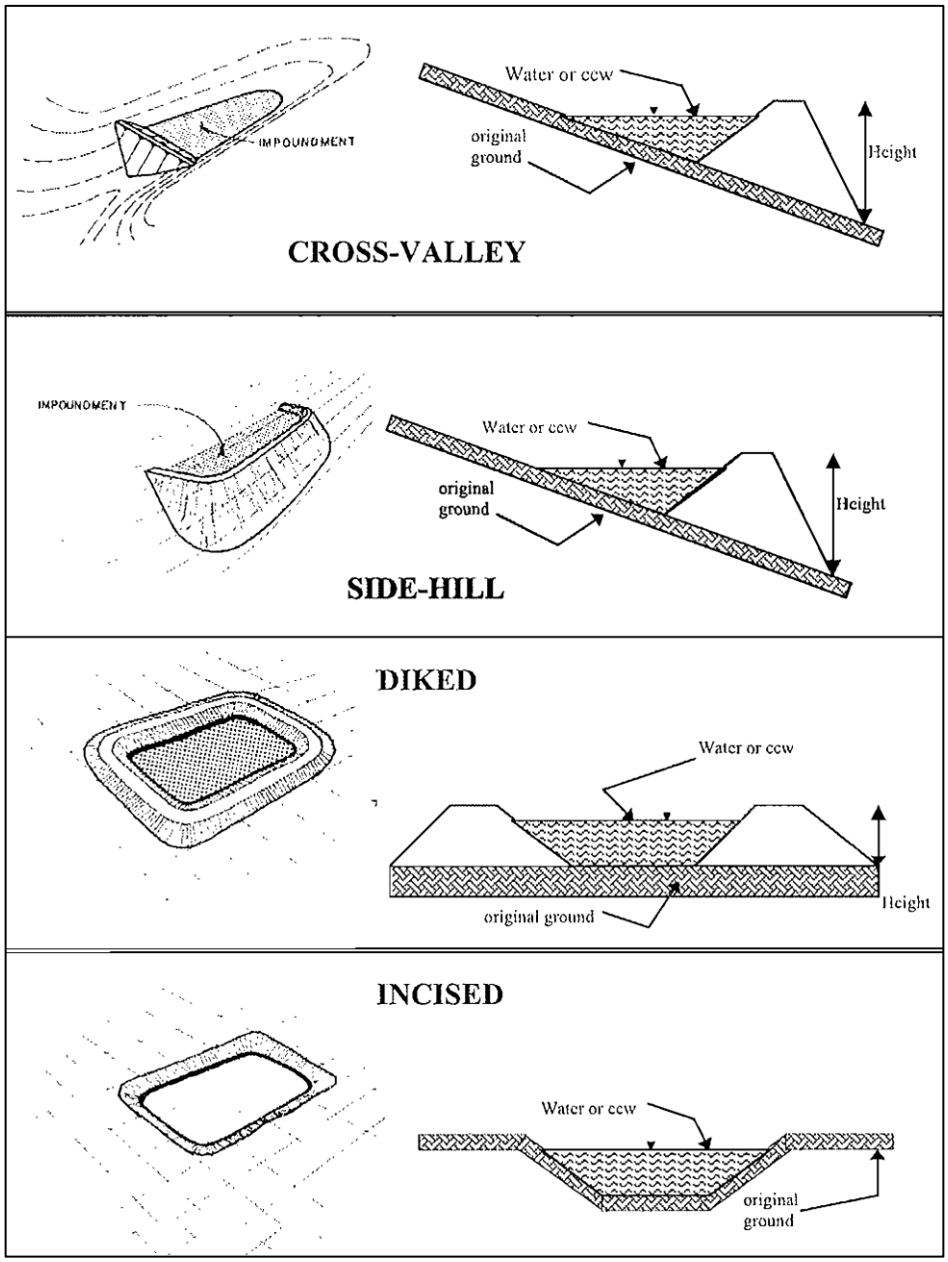
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

The North Fly Ash pond is located approximately 2 miles upstream of the Little Blue River. In-between the pond and the river are Truman Road, County Highway 78 and farm fields. Located just downstream of the North Fly Ash Pond is a railroad embankment with a 48" diameter stormwater CMP culvert for the former Missouri Pacific Railroad spurs into the plant site. We believe that the embankment will act as a secondary containment for the North Fly Ash Pond should it fail and control the amount of discharge off-site through the 48" CMP culvert. Therefore, we would not expect there to be flooding occurring downstream which would result in loss of life, and we would also expect a limited amount of flyash to leave the site.

CONFIGURATION:



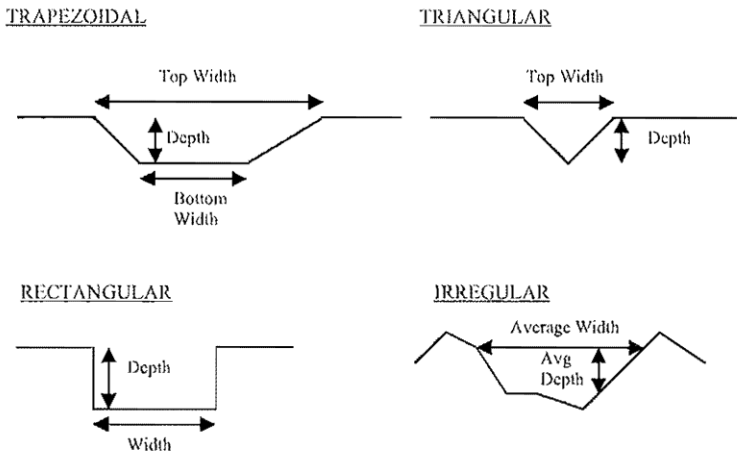
_____ Cross-Valley
_____ Side-Hill
__X__ Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height __22__ feet Embankment Material __On site soils – clayey soils__
Pool Area __16.8__ acres Liner __None__
Current Freeboard __4.5__ feet Liner Permeability __N/A__

TYPE OF OUTLET (Mark all that apply)

_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Triangular

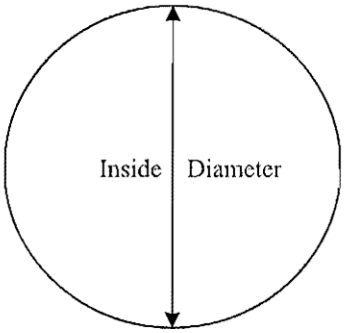
_____ Depth
_____ Bottom (or average) width
_____ Top width



__X__ **Outlet**

~~8 inch~~ inside diameter

Material
_____ corrugated metal
_____ welded steel
_____ concrete
__X__ plastic (hdpe**, pvc,** etc.)
_____ other (specify_____



Is water flowing through the outlet? YES_____ NO__X__

_____ **No Outlet**

_____ **Other Type of Outlet (Specify)** _____

The Impoundment was Designed By: **Stanley Consultants – Richard Marr, P.E., License Number, E-22463, Date July 1988.**

Has there ever been a failure at this site? YES _____ NO __X__

If So When?_____

If So Please Describe:

Has there ever been significant seepages at this site? YES _____ NO __X__

If So When? _____

If So Please Describe:

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO __X__

If So which method (e.g., piezometers, gw pumping, …)? _____

If So Please Describe:

Site Name: **Blue Valley Power Station** Date: **November 4, 2010**

Unit Name: **South Fly Ash Pond** Operator's Name: **City Of Independence, MO**

Unit ID: Hazard Potential Classification: High Significant **Low**

Inspector's Name: **Steve Townsley and William Butler – GEI Consultants, Inc.**

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	X		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	764		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	TBD		20. Decant Pipes		
4. Open channel spillway elevation (operator records)?	TBD		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	767		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?	NA		Is water exiting outlet flowing clear?	X	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?	N/A		From underdrain?	N/A	
9. Trees growing on embankment? (If so, indicate largest diameter below.)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?		X	From downstream foundation area?		X
13. Depressions or sink holes in tailings surface or whirlpool in the pool area		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or underdrains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
1. Frequency of Company's Dam Inspections?	There is twice a year maintenance inspections by plant personnel, but no reports are prepared of the findings or corrections taken.
2. Pool elevation (operator records)?	Maximum pond level as noted on design drawings.

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # TBD INSPECTOR: S. Townsley/W. Butler

Date: November 4, 2010

Impoundment Name: Blue Valley Power Station – South Fly Ash Pond

Impoundment Company: City of Independence Power & Light Department

EPA Region 7

State Agency (Field Office) Address N/A

Name of Impoundment: Blue Valley Power Station – South Fly Ash Pond

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update _____

	Yes	No
Is impoundment currently under construction?		X
Is water or ccw currently being pumped into the impoundment?		X

IMPOUNDMENT FUNCTION: Former Fly Ash Collection Pond taken out of service in 1991.

Nearest Downstream Town: Name Independence, Missouri
Distance from the impoundment Within the city limits
Impoundment Location:

Longitude	94	Degrees	19	Minutes	23	Seconds
Latitude	39	Degrees	5	Minutes	52	Seconds
State:	MO	County	Jackson			

Does a state agency regulate this impoundment? YES X NO _____

If So Which Sate Agency? Missouri Department of Natural Resources – Division of Geology and Land Survey

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW** HAZARD POTENTIAL: Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

__X__ **LOW HAZARD POTENTIAL:** Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

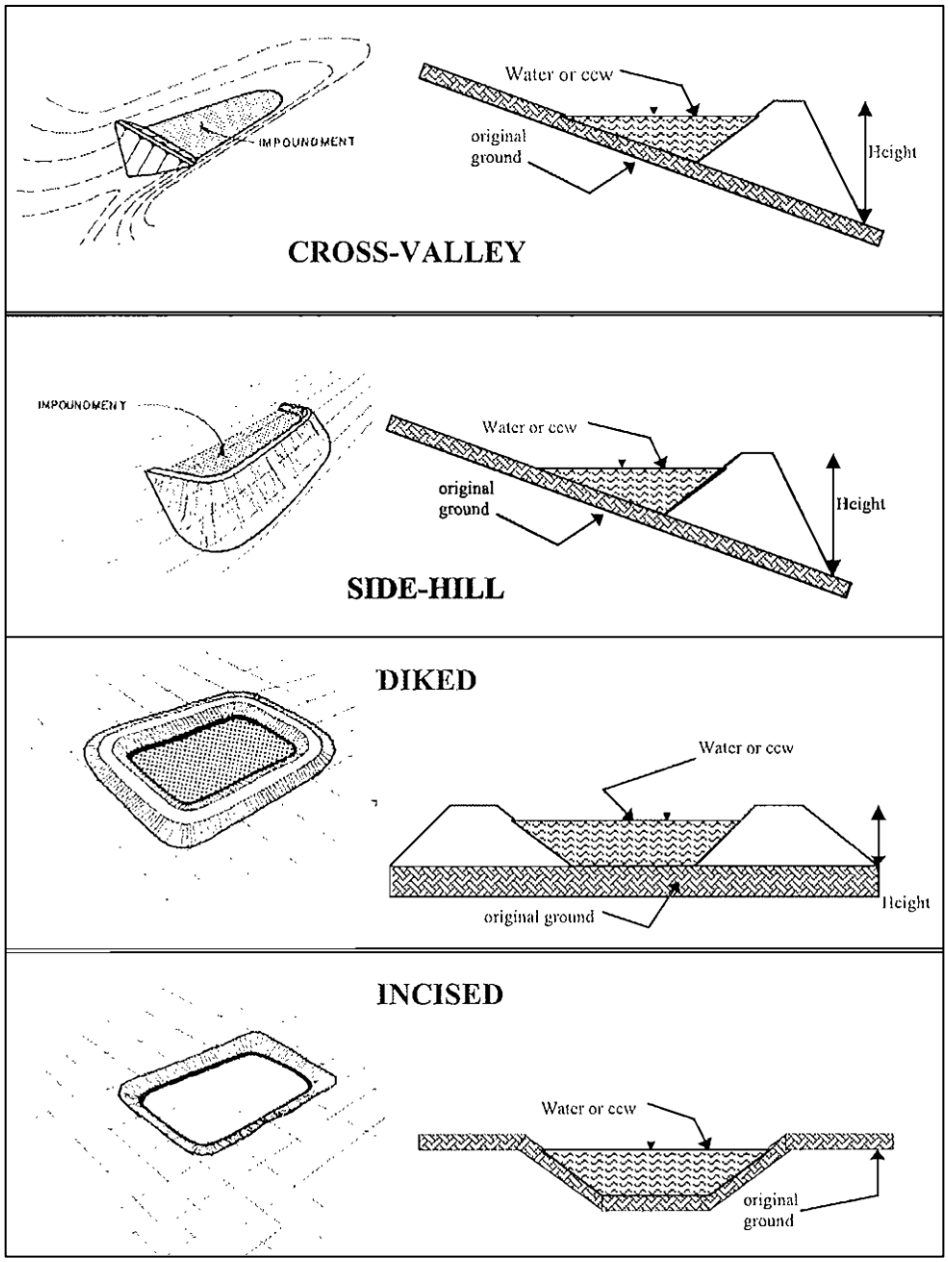
_____ **SIGNIFICANT HAZARD POTENTIAL:** Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

_____ **HIGH HAZARD POTENTIAL:** Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

DESCRIBE REASONING FOR HAZARD RATING CHOSEN:

The North Fly Ash pond is located approximately 2 miles upstream of the Little Blue River. In-between the pond and the river are Truman Road, County Highway 78 and farm fields. Located just downstream of the North Fly Ash Pond is a railroad embankment with a 48" diameter stormwater CMP culvert for the former Missouri Pacific Railroad spurs into the plant site. We believe that the embankment will act as a secondary containment for the North Fly Ash Pond should it fail and control the amount of discharge off-site through the 48" CMP culvert. Therefore, we would not expect there to be flooding occurring downstream which would result in loss of life, and we would also expect a limited amount of flyash to leave the site.

CONFIGURATION:



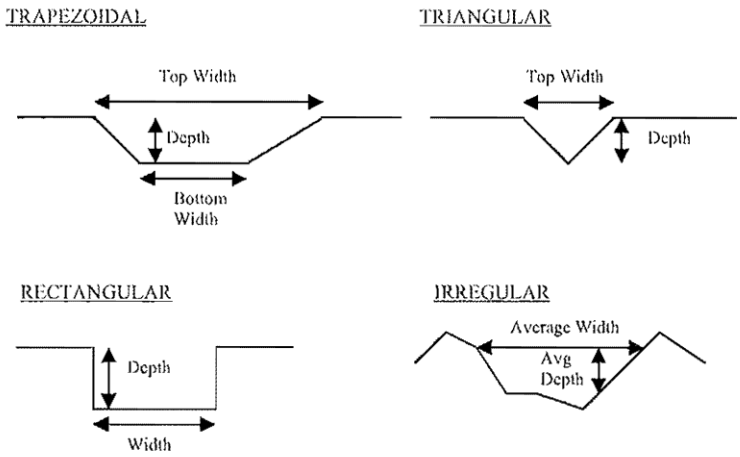
_____ Cross-Valley
__X__ Side-Hill
_____ Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height __19__ feet Embankment Material **On site soils – clayey soils**
Pool Area **15.1** acres Liner **None**
Current Freeboard __3__ feet Liner Permeability **N/A**

TYPE OF OUTLET (Mark all that apply)

_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Triangular

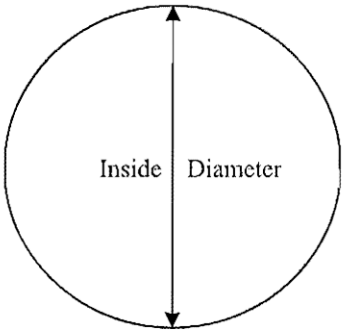
_____ Depth
_____ Bottom (or average) width
_____ Top width



_____ **Outlet**

_____ inside diameter

Material
_____ corrugated metal
_____ welded steel
_____ concrete
_____ plastic (hdpe, pvc, etc.)
_____ other (specify_____



Is water flowing through the outlet? YES_____ NO__X__

__X__ **No Outlet**

_____ **Other Type of Outlet (Specify)** _____

The Impoundment was Designed By: **Burns and McDonnell Engineers-Architects-Consultants John O'Donnell P.E. License Number E-15992 Dated December 30, 1977.**

Has there ever been a failure at this site? YES _____ NO __X__

If So When?_____

If So Please Describe:

Has there ever been significant seepages at this site? YES _____ NO __X__

If So When? _____

If So Please Describe:

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO __X__

If So which method (e.g., piezometers, gw pumping, …)? _____

If So Please Describe:

Site Name: **Blue Valley Power Station** Date: **November 4, 2010**

Unit Name: **Bottom Ash Pond** Operator's Name: **City of Independence, MO**

Unit ID: Hazard Potential Classification: High Significant **Low**

Inspector's Name: **Steve Townsley and William Butler – GEI Consultants, Inc.**

Check the appropriate box below, Provide comments when appropriate. If not applicable or not available, record "N/A", Any unusual conditions or construction practices that should be noted in the comments section, For large diked embankments, separate checklists may be used for different embankment areas. If separate forms are used, identify approximate area that the form applies to in comments.

	Yes	No		Yes	No
1. Frequency of Company's Dam Inspections?	X		18. Sloughing or bulging on slopes?		X
2. Pool elevation (operator records)?	~764		19. Major erosion or slope deterioration?		X
3. Decant inlet elevation (operator records)?	TBD		20. Decant Pipes		
4. Open channel spillway elevation (operator records)?	N/A		Is water entering inlet, but not exiting outlet?		X
5. Lowest dam crest elevation (operator records)?	767		Is water exiting outlet, but not entering inlet?		X
6. If instrumentation is present, are readings recorded (operator records)?		X	Is water exiting outlet flowing clear?	N/A	
7. Is the embankment currently under construction?		X	21. Seepage (specify location, if seepage carries fines, and approximate seepage rate below):		
8. Foundation preparation (remove vegetation, stumps, topsoil in area where embankment fill will be placed)?	N/A		From under drain?	N/A	
9. Trees growing on embankment? (If so, indicate largest diameter below.)		X	At isolated points on embankment slopes?		X
10. Cracks or scarps on crest?		X	At natural hillside in the embankment area?		X
11. Is there significant settlement along the crest?		X	Over widespread areas?		X
12. Are decant trashracks clear and in place?	N/A		From downstream foundation area?		X
13. Depressions or sink holes in tailings surface or whirlpool in the pool area		X	"Boils" beneath stream or ponded water?		X
14. Clogged spillways, groin or diversion ditches?		X	Around the outside of the decant pipe?		X
15. Are spillway or ditch linings deteriorated?	N/A		22. Surface movements in valley bottom or on hillside?		X
16. Are outlets of decant or under drains blocked?		X	23. Water against downstream toe?		X
17. Cracks or scarps on slopes		X	24. Were Photos taken during the dam inspection?	X	

Major adverse changes in these items could cause instability and should be reported for further evaluation. Adverse conditions noted in these items should normally be described (extent, location, volume, etc.) in the space below and on the back of this sheet.

Inspection Issue #	Comments
1. Frequency of Company's Dam Inspections?	There is twice a year maintenance inspections by plant personnel, but no reports are prepared of the findings or corrections taken.
6. If instrumentation is present, are readings recorded (operator records)?	Outfall No. 2 from Bottom Ash Pond into wastewater collection system is recorded continuously for discharge rate.

Coal Combustion Waste (CCW)
Impoundment Inspection

Impoundment NPDES Permit # TBD INSPECTOR: S. Townsley/W. Butler

Date: November 4, 2010

Impoundment Name: Blue Valley Power Station – Bottom Fly Ash Pond

Impoundment Company: City of Independence Power & Light Department

EPA Region 7

State Agency (Field Office) Address N/A

Name of Impoundment: Blue Valley Power Station – Bottom Ash Pond

(Report each impoundment on a separate form under the same Impoundment NPDES Permit number)

New X Update _____

	Yes	No
Is impoundment currently under construction?		X
Is water or ccw currently being pumped into the impoundment?		X

IMPOUNDMENT FUNCTION: Bottom ash collection pond with recirculation pump/pipeline system for ash slurry.

Nearest Downstream Town: Independence, Missouri

Distance from the impoundment: Within the city limits

Impoundment Location:

Longitude 94 Degrees 19 Minutes 23 Seconds

Latitude 39 Degrees 5 Minutes 52 Seconds

State: MO County Jackson

Does a state agency regulate this impoundment? YES X NO _____

If So Which Sate Agency? **Missouri Department of Natural Resources – Division of Geology and Land Survey**

HAZARD POTENTIAL (In the event the impoundment should fail, the following would occur):

_____ **LESS THAN LOW HAZARD POTENTIAL**: Failure or misoperation of the dam results in no probable loss of human life or economic or environmental losses.

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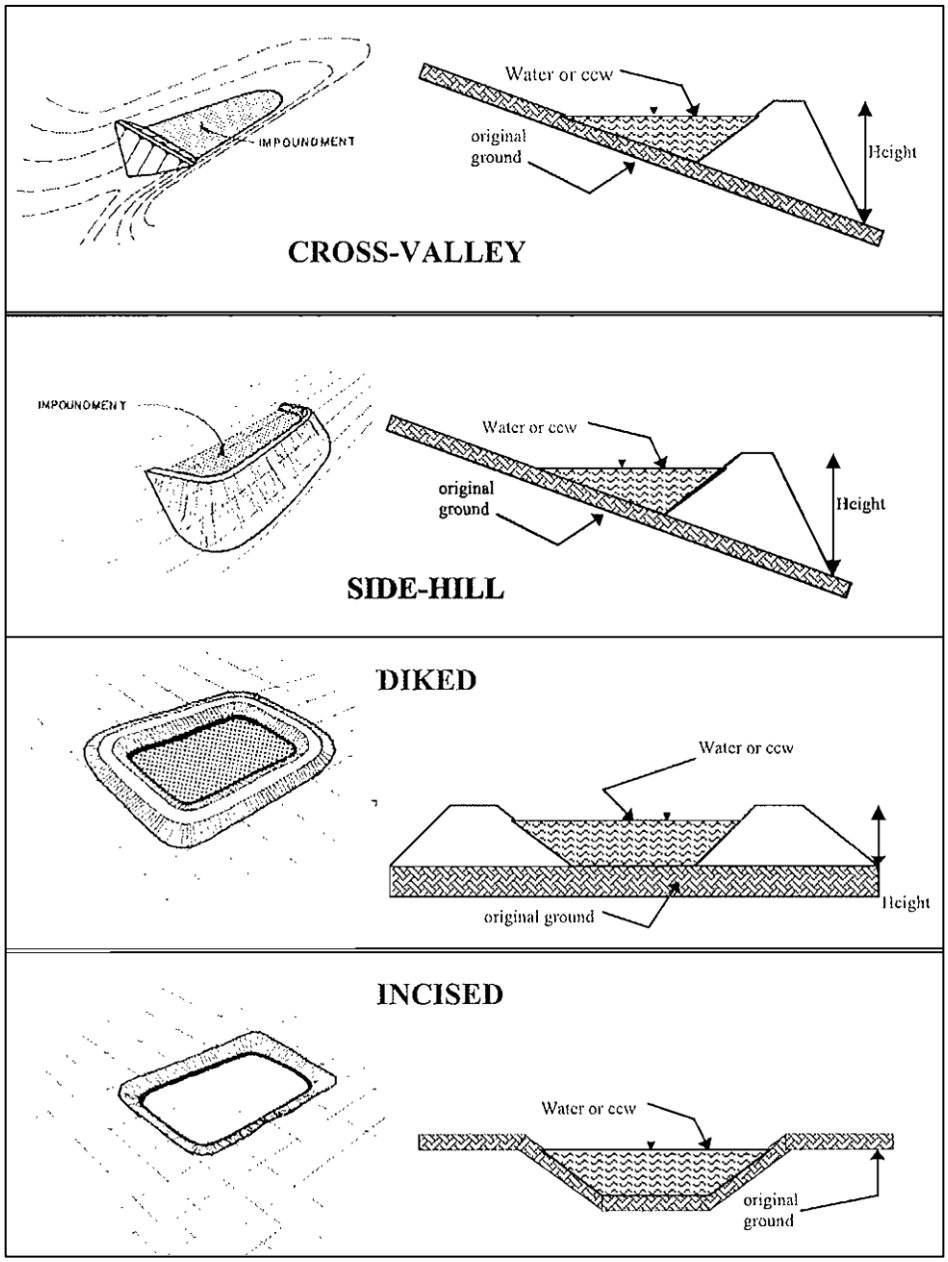
CONFIGURATION:



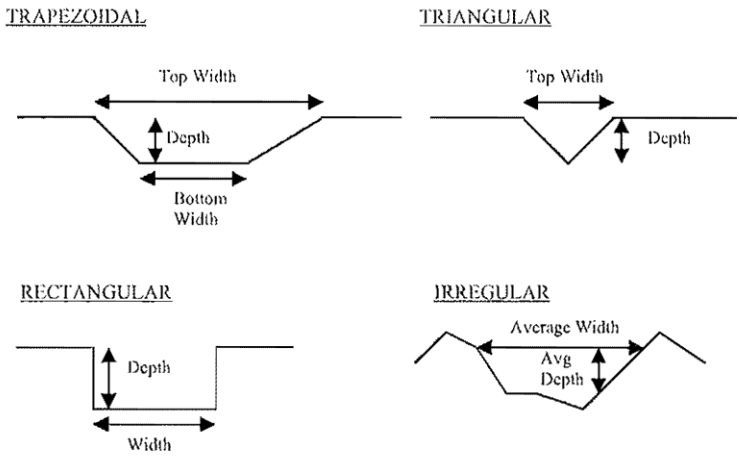
_____ Cross-Valley
__X__ Side-Hill
_____ Diked
_____ Incised (form completion optional)
_____ Combination Incised/Diked

Embankment Height __13__ feet Embankment Material **On site soils – clayey soils**
Pool Area **9.3** acres Liner **None**
Current Freeboard __3__ feet Liner Permeability **N/A**

TYPE OF OUTLET (Mark all that apply)

_____ **Open Channel Spillway**
_____ Trapezoidal
_____ Triangular
_____ Triangular

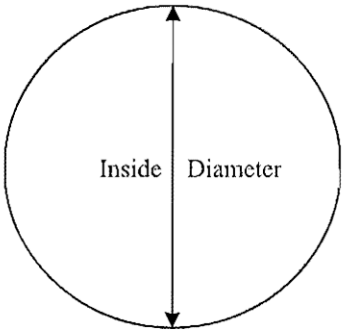
_____ Depth
_____ Bottom (or average) width
_____ Top width



__X__ **Outlet**

__12__ inside diameter

Material
_____ corrugated metal
__X__ welded steel
_____ concrete
_____ plastic (hdpe**, pvc,** etc.)
_____ other (specify_____



Is water flowing through the outlet? YES__X__ NO_____

_____ **No Outlet**

_____ **Other Type of Outlet (Specify)** _____

The Impoundment was Designed By: **Burns and McDonnell -Architects-Consultants**
John O'Donnell P.E. License Number E-15992 Dated December 30, 1977.

Has there ever been a failure at this site? YES _____ NO __X__

If So When?_____

If So Please Describe:

Has there ever been significant seepages at this site? YES _____ NO __X__

If So When? _____

If So Please Describe:

Has there ever been any measures undertaken to monitor/lower Phreatic water table levels based on past seepages or breaches at this site? YES _____ NO __X__

If So which method (e.g., piezometers, gw pumping, …)? _____

If So Please Describe:

Appendix B

Inspection Photographs

November 4, 2010

Photo 1: Looking south along the east dike of the North Fly Ash Pond.

**Photo 2: The north east corner of the North Fly Ash Pond dike.
Note possible seepage occurring at dike toe.**

Photo 3: Looking south along the east dike of the North Fly Ash Pond. Note possible seepage occurring at the dike toe.

Photo 4: Looking east from the North Ash Pond dike at the abandoned railroad embankment. Site storm water is discharged to a 48-inch-diameter culvert.

Photo 5: Return water pump house at north end of the Bottom Ash Pond.

Photo 6: The Bottom Ash Intake Structure at the north end of the Bottom Ash Pond.

Photo 7: The overflow outlet from the North Fly Ash Pond into the Bottom Ash Pond.

Photo 8: Looking south at the dike that separates the Bottom Ash Pond (right) from the South Fly Ash Pond (left).

Photo 9: Trees on slope of pump house access road slope at the northwest corner of the Bottom Ash Pond

Photo 10: Looking south at the Bottom Ash Pond west dike. Taken from the northwest corner of the Bottom Ash Pond.

Photo 11: Looking north at the east dike of the South Fly Ash Pond.

Photo 12: Outfall 002 and associated channel which is the outlet from the Bottom Ash Pond into the sanitary sewer system.

Photo 13: The flowmeter to monitor the discharge from the Bottom Ash Pond into the sanitary sewer system.

Photo 14: Inlet pipe to the Bottom Ash Pond.

Photo 15: Looking north at the west dike of the Bottom Ash Pond.

Photo 16: Looking south at the channel from the Bottom Ash Pond discharge into the pond.